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EXAMINER	
JARRETT, RYAN A	
ART UNIT	**PAPER NUMBER**
2125	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/07/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/672,527	AHMED, OSMAN	
	Examiner	Art Unit	
	Ryan A. Jarrett	2125	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 December 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,5-12 and 21-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5-12 and 21-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 December 2006* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claims 1, 2, 5-12, and 21-36 and pending in the application and are presented below for examination.

Priority

Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 120 is acknowledged. This application is a voluntary "Divisional" of U.S. Patent Application No. 10/353,110, filed 01/28/2003.

It is noted that this application appears to claim subject matter disclosed in prior Application No. 60/352,452, filed 01/28/2002. A reference to the prior application must be inserted as the first sentence(s) of the specification of this application or in an application data sheet (37 CFR 1.76), if applicant intends to rely on the filing date of the prior application under 35 U.S.C. 119(e), 120, 121, or 365(c). See 37 CFR 1.78(a). For benefit claims under 35 U.S.C. 120, 121, or 365(c), the reference must include the relationship (i.e., continuation, divisional, or continuation-in-part) of all nonprovisional applications. If the application is a utility or plant application filed under 35 U.S.C. 111(a) on or after November 29, 2000, the specific reference to the prior application must be submitted during the pendency of the application and within the later of four months from the actual filing date of the application or sixteen months from the filing date of the prior application. If the application is a utility or plant application which entered the national stage from an international application filed on or after November 29, 2000, after compliance with 35 U.S.C. 371, the specific reference must be submitted during the pendency of the application and within the later of four months from the date on which the national stage commenced under 35 U.S.C. 371(b) or (f) or sixteen months from the filing date of the prior application. See 37 CFR 1.78(a)(2)(ii) and (a)(5)(ii). This time period is not extendable and a failure to submit the reference required by 35 U.S.C. 119(e) and/or 120, where

applicable, within this time period is considered a waiver of any benefit of such prior application(s) under 35 U.S.C. 119(e), 120, 121 and 365(c). A benefit claim filed after the required time period may be accepted if it is accompanied by a grantable petition to accept an unintentionally delayed benefit claim under 35 U.S.C. 119(e), 120, 121 and 365(c). The petition must be accompanied by (1) the reference required by 35 U.S.C. 120 or 119(e) and 37 CFR 1.78(a)(2) or (a)(5) to the prior application (unless previously submitted), (2) a surcharge under 37 CFR 1.17(t), and (3) a statement that the entire delay between the date the claim was due under 37 CFR 1.78(a)(2) or (a)(5) and the date the claim was filed was unintentional. The Director may require additional information where there is a question whether the delay was unintentional. The petition should be addressed to: Mail Stop Petition, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

If the reference to the prior application was previously submitted within the time period set forth in 37 CFR 1.78(a), but not in the first sentence(s) of the specification or an application data sheet (ADS) as required by 37 CFR 1.78(a) (e.g., if the reference was submitted in an oath or declaration or the application transmittal letter), and the information concerning the benefit claim was recognized by the Office as shown by its inclusion on the first filing receipt, the petition under 37 CFR 1.78(a) and the surcharge under 37 CFR 1.17(t) are not required. Applicant is still required to submit the reference in compliance with 37 CFR 1.78(a) by filing an amendment to the first sentence(s) of the specification or an ADS. See MPEP § 201.11.

The effective filing date of this application is considered to be 01/28/2003.

Drawings

The drawings were received on 12/11/2006. These drawings are acceptable for examination purposes only, due to the informalities of the amendments.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 2, and 5-12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation, "wherein the output digital signal is representative of the first control output". The meaning of this limitation is unclear. This limitation "representative" implies that output digital signal and the first control output are the same, or interchangeable (see also Applicant's arguments on page 25 of the response filed 12/11/2006). But this interpretation does not make sense in the context of the claim, since the claim recites that the processing circuit is "configured to" generate the output digital signal and "is further configured to generate a first control output", which implies that the output digital signal and the first control output are separate and distinct signals. For the purposes of claim interpretation, the "output digital signal" and the "first control output" are considered to be separate and distinct signals.

Furthermore, the "output digital signal" is interpreted to be merely a digital representation of the analog sensor process value. This is a reasonable interpretation based on the claim language, i.e., "convert". Therefore, it is not logical to state that the output digital signal can further be "representative" of a control signal which is based on said sensor process value and a setpoint. In other words, it is ambiguous to recite that the "output digital signal is representative of the first control output", since these are clearly two different and distinct signals. One is a digital sensor reading, another is a control output based on the sensor reading and a setpoint.

Claims 2 and 5-12 depend from claim 1 and incorporate the same deficiencies.

References Relied Upon

WO 00/54237, hereinafter referred to as "Graviton".

Yamazaki et al. US 2001/0033963

L. Doherty, B.A. Warneke, B.E. Doser, and K.S.J. Pister. "Energy and Performance Considerations for Smart Dust". International Journal of Parallel and Distributed Systems and Networks 4.3 (2001): 121-133, hereinafter referred to as "Doherty et al.".

"Brainy Buildings using 'Smart Dust' can Keep Soaring Energy Costs in Check, say UC Berkeley Researchers". UC Berkeley Media Relations 25 May 2001, hereinafter referred to as "UC Berkely".

E. Jacobsen. "The Building Blocks of a Smart Sensor for Distributed Control Networks". Northcon/96 (1996): 285-290, hereinafter referred to as "Jacobsen".

J. Hill, R. Szewczyk, A. Woo, S. Hollar, D. Culler, and K. Pister. "System Architecture Directions for Networked Sensors" ACM Press 35.11 (2000): 93-104, hereinafter referred to as "Hill et al.".

G. Asada, M. Dong, T.S. Lin, F. Newberg, G. Pottie, W.J. Kaiser, and H.O. Marcy. "Wireless Integrated Network Sensors: Low Power Systems on a Chip". Proceedings of the 1998 European Solid State Circuits Conference (1998): 9-16, hereinafter referred to as "Asada et al.".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Rejections based on Graviton

Claims 1, 2, 5, 7, 11, 12, and 26-36 are rejected under 35 U.S.C. 102(b) as being anticipated by WO 00/54237 to Graviton, Inc. ("Graviton"), supplied by the applicant.

Graviton discloses:

1. **An apparatus** (e.g., Fig. 4 #50: "SENSOR ASSEMBLY") **for use in a building automation system, the building automation system including one or more devices that are operable to generated control outputs based on set point information and process value information from one or more sensors, the building automation system further including one or more actuators operable to perform an operation responsive to at least some of the control outputs** (EN: *Statements of intended use in the preamble or statements that don't limit the structure of the claimed "apparatus" are not given patentable weight. The "building automation system including one or more devices" is external to the claimed "apparatus" and is not given patentable weight.*)**, the apparatus comprising:**

at least one microlectromechanical (MEMs) sensor device operable to generate a process value device (e.g., Fig. 4 #52: "CANTILEVER CHIP", pg. 18 lines 16-17: "The various sensors 52, 100 and actuators 92 may be implemented through various microelectromechanical devices, also known as MEMS.")**;**

a processing circuit configured to convert the process value to an output digital signal (e.g., Fig. 4 #56: "ADC", Fig. 4 #60: "PROCESSOR") **and to cause the output digital signal to be communicated to another element of the building automation system** (e.g., pg. 6 lines 19-29: "The actuator commands may be received via...another sensor assembly")**; and**

wherein the at least one MEMs sensor device and the processing circuit are integrated onto a first substrate (e.g., pg. 15 line 31 – pg. 16 line 3: "The system preferably includes a single chip including both the sensor, required

logic components or processing components, e.g., microprocessor, and a wireless transmission component, e.g., radio frequency generator, all included within a single chip. By integrating the sensing, processing (optional memory), and transmission functionalities, the device may be made compact and robust."); **and**

wherein the processing circuit (e.g., Fig. 4 #60: "PROCESSOR") **is further configured to generate a first control output** (e.g., pg. 6 lines 19-29: "The actuator commands may be received via...another sensor assembly", pg. 27 lines 16-17: "Such control may be effected at a purely local level, such as through the action of the processor 60 itself") **based on at least one set point and the process value obtained from the at least one MEMs sensor device** (e.g., pg. 18 lines 11-15: "the use of humidity and temperature sensors within the system by permitting correction of those effects", EN: *Correcting a temperature effect implies correcting a temperature with respect to a setpoint,* pg. 19 lines 22-23: "For example, a switch actuated by the presence of a...temperature change", EN: *Implies temperature change with respect to a setpoint,* pg. 27 lines 12-16: For example, the sensing of ingredients detects a situation requiring action to ensure that the final products conforms to the specifications, then a feedback or closed loop action may be taken so as to change aspects of the ingredients or the recipe or method of treatment of those ingredients in the process.", EN: *The "specifications" correlate to the claimed "setpoint",* pg. 27 lines 23-25: "In yet another aspect, when a contaminant or other process parameter is detected to be out of specification, an alert or alarm condition may be generated.", EN: *The "specifications" correlate to the claimed "setpoint",* pg. 29 lines 8-13: "process control...error conditions", EN: *An "error condition" is a deviation of a process control value from a setpoint.*)**, and wherein the output digital signal is representative of the first control output** (e.g., pg. 6 lines 19-29: "The actuator commands may be received via...another sensor assembly").

2. **The apparatus of claim 1 wherein the processing circuit includes a microelectronics A/D converter** (e.g., Fig. 4 #56: "ADC")**, the**

microelectronics A/D converter operable to receive the process value from the at least one MEMs sensor device and generate a digital sensor signal therefrom (e.g., pg. 4 lines 15-24, pg. 15 lines 21-30).

5. The apparatus of claim 1 wherein the at least one MEMs sensor device includes a plurality of MEMs sensor devices (e.g., pg. 15 lines 14-16).

7. The apparatus of claim 1 wherein the first substrate is a semiconductor substrate (e.g., pg. 15 line 31 – pg. 16 line 3).

11. The apparatus of claim 1 further comprising an RF communication circuit operably coupled to the processing circuit (e.g., pg. 15 line 31 – pg. 16 line 3: "radio frequency generator")**, the RF communication circuit operably connected to provide the output digital signal go the other element of the building automation system.**

12. The apparatus of claim 1 further comprising an EEPROM operably coupled to the processing circuit (e.g., pg. 4 line 31 – pg. 5 line 2: "In the preferred embodiment, the sensor assembly containing the digital sensor includes a processor. Such a processor may comprise a microprocessor and associated components including memory (RAM, ROM, mass storage, Flash, optical memory, Biomemory, etc.)", EN: *Flash memory is a type of electronically erasable programmable non-volatile memory.*).

26. An apparatus (e.g., Fig. 4 #50: "SENSOR ASSEMEBLY") **for use in a building automation system, the building automation system including one or more devices that are operable to generate a control output based on set point information and process value information from one or more sensors** (EN: *Statements of intended use in the preamble or statements that don't limit the structure of the claimed "apparatus" are not given patentable weight. The "building automation system including one or more devices" is external to the claimed "apparatus" and is not given patentable weight.*)**, the apparatus comprising:**

at least one microelectromechanical (MEMs) sensor device operable to generate a process value (e.g., Fig. 4 #52: "CANTILEVER CHIP", pg. 18

lines 16-17: "The various sensors 52, 100 and actuators 92 may be implemented through various microelectromechanical devices, also known as MEMS.");

a processing circuit (e.g., Fig. 4 #56: "ADC", Fig. 4 #60: "PROCESSOR") **operably connected to the at least one MEMS sensor device to receive the process value therefrom, the processing circuit configured to convert the process value to an output digital signal** (e.g., pg. 4 lines 15-24, pg. 15 lines 21-30) **configured to be communicated to another element of the building automation system** (e.g., pg. 6 lines 19-29: "The actuator commands may be received via...another sensor assembly");

a programmable non-volatile memory (e.g., pg. 4 line 31 – pg. 5 line 2: "In the preferred embodiment, the sensor assembly containing the digital sensor includes a processor. Such a processor may comprise a microprocessor and associated components including memory (RAM, ROM, mass storage, Flash, optical memory, Biomemory, etc.)", EN: *Flash memory is a type of programmable non-volatile memory.*), **operably coupled to the processing circuit and supported by the first substrate** (e.g., pg. 15 line 31 – pg. 16 line 3: "The system preferably includes a single chip including both the sensor, required logic components or processing components, e.g., microprocessor, and a wireless transmission component, e.g., radio frequency generator, all included within a single chip. By integrating the sensing, processing (optional memory), and transmission functionalities, the device may be made compact and robust.", EN: *The system preferably includes a single chip including both the processing components and memory, which, as disclosed at pg. 5 line 1 of Graviton, can be a Flash memory.*); **and**

wherein the at least one MEMS sensor device and the processing circuit are integrated onto a first substrate (e.g., pg. 15 line 31 – pg. 16 line 3: "The system preferably includes a single chip including both the sensor, required logic components or processing components, e.g., microprocessor, and a wireless transmission component, e.g., radio frequency generator, all included

within a single chip. By integrating the sensing, processing (optional memory), and transmission functionalities, the device may be made compact and robust.").

27. The apparatus of claim 26, wherein the programmable non-volatile memory comprises an EEPROM (e.g., pg. 4 line 31 – pg. 5 line 2: "In the preferred embodiment, the sensor assembly containing the digital sensor includes a processor. Such a processor may comprise a microprocessor and associated components including memory (RAM, ROM, mass storage, Flash, optical memory, Biomemory, etc.)", EN: *Flash memory is a type of electronically erasable programmable non-volatile memory.*) **configured to store information generated by an external device selecting less than all of the available functions of the apparatus to be enabled** (e.g., pg. 16 lines 24-29: "Memory may be utilized...to store program information which achieves the functionality described herein.", pg. 24 lines 9-13: "intended function of the device", EN: *It is further noted that apparatus claims must be structurally distinguishable from the prior art. This is an intended use/functional limitation of the claimed "memory". The prior art "memory" of Graviton is capable of storing infinitely many types of information, including configuration information generated by an external device.*).

28. The apparatus of claim 26, wherein the programmable non-volatile memory is further operable to store configuration information relating to the apparatus (e.g., pg. 16 lines 24-29: "Memory may be utilized...to store program information which achieves the functionality described herein.", EN: *It is further noted that apparatus claims must be structurally distinguishable from the prior art. This is an intended use/functional limitation of the "memory". The prior art "memory" of Graviton is capable of storing infinitely many types of information, including configuration information.*).

29. The apparatus of claim 28, wherein the configuration information includes identification information for the apparatus (e.g., pg. 24 lines 9-13: "identification number", EN: *It is further noted that apparatus claims must be structurally distinguishable from the prior art. This is an intended use/functional*

limitation of the "memory". The prior art "memory" of Graviton is capable of storing infinitely many types of information, including identification information.).

30. The apparatus of claim 29, wherein the configuration information includes a network address corresponding to the apparatus (e.g., pg. 24 lines 9-13: "address", EN: *It is further noted that apparatus claims must be structurally distinguishable from the prior art. This is an intended use/functional limitation of the "memory". The prior art "memory" of Graviton is capable of storing infinitely many types of information, including network address information.*).

31. The apparatus of claim 28, wherein the configuration information includes function enabling information, the function identifying information identifying as enabled less than all of the possible sensing functions available to be enabled on the sensor (e.g., pg. 16 lines 24-29: "Memory may be utilized...to store program information which achieves the functionality described herein.", pg. 24 lines 9-13: "intended function of the device", EN: *It is further noted that apparatus claims must be structurally distinguishable from the prior art. This is an intended use/functional limitation of the claimed "memory". The prior art "memory" of Graviton is capable of storing infinitely many types of information, including configuration information generated by an external device. Applicant has not positively recited a memory storing configuration information.*).

32. The apparatus of claim 28, wherein the configuration information includes system RF communication parameters (e.g., pg. 13 line 24 – pg. 14 line 4, pg. 16 lines 24-29: "Memory may be utilized...to store program information which achieves the functionality described herein.", EN: *It is further noted that apparatus claims must be structurally distinguishable from the prior art. This is an intended use/functional limitation of the "memory". The prior art "memory" of Graviton is capable of storing infinitely many types of information, including RF communication parameters.*).

33. The apparatus of claim 27, wherein the EEPROM is further operable to store configuration information relating to the apparatus (e.g., pg. 16

lines 24-29: "Memory may be utilized...to store program information which achieves the functionality described herein.", EN: *It is further noted that apparatus claims must be structurally distinguishable from the prior art. This is an intended use/functional limitation of the "memory". The prior art "memory" of Graviton is capable of storing infinitely many types of information, including configuration information.*).

34. The apparatus of claim 33, wherein the configuration information includes identification information for the apparatus (e.g., pg. 24 lines 9-13: "identification number", EN: *It is further noted that apparatus claims must be structurally distinguishable from the prior art. This is an intended use/functional limitation of the "memory". The prior art "memory" of Graviton is capable of storing infinitely many types of information, including identification information.*).

35. The apparatus of claim 33, wherein the configuration information includes function enabling information, the function enabling information identifying as enabled less than all of the possible sensing functions available to be enabled on the sensor (e.g., pg. 16 lines 24-29: "Memory may be utilized...to store program information which achieves the functionality described herein.", pg. 24 lines 9-13: "intended function of the device", EN: *It is further noted that apparatus claims must be structurally distinguishable from the prior art. This is an intended use/functional limitation of the claimed "memory". The prior art "memory" of Graviton is capable of storing infinitely many types of information, including configuration information generated by an external device. Applicant has not positively recited a memory storing configuration information.*).

36. The apparatus of claim 27, wherein the EEPROM is integrated on to the first substrate (e.g., pg. 4 line 31 – pg. 5 line 2, pg. 15 line 31 – pg. 16 line 3: "The system preferably includes a single chip including both the sensor, required logic components or processing components, e.g., microprocessor, and a wireless transmission component, e.g., radio frequency generator, all included within a single chip. By integrating the sensing, processing (optional memory), and transmission functionalities, the device may be made compact and robust.",

EN: *The system preferably includes a single chip including both the processing components and memory, which, as disclosed at pg. 5 line 1 of Graviton, can be a Flash memory, i.e., electronically erasable programmable memory.*).

Claims 6, 8-10, and 21-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Graviton as applied to claim 1 above, and further in view of Yamazaki et al. US 2001/0033963.

Regarding claims 6, 21, and 22, Graviton discloses:

6. The apparatus of claim 1 further comprising a battery ~~secured~~ connected to the first substrate (e.g., pg. 15 lines 14-21: "battery", pg. 15 line 31 – pg. 16 line 3: "the device may be made compact").

21. An apparatus (e.g., Fig. 4 #50: "SENSOR ASSEMBLY") **for use in a building automation system, the building automation system including one or more devices that are operable to generate a control output based on set point information and process value information from one or more sensors** (EN: *Statements of intended use in the preamble or statements that don't limit the structure of the claimed "apparatus" are not given patentable weight. The "building automation system including one or more devices" is external to the claimed "apparatus" and is not given patentable weight.*), **the apparatus comprising:**

at least one microelectromechanical (MEMs) sensor device operable to generate a process value device (e.g., Fig. 4 #52: "CANTILEVER CHIP", pg. 18 lines 16-17: "The various sensors 52, 100 and actuators 92 may be implemented through various microelectromechanical devices, also known as MEMS.");

a processing circuit operably connected to the at least one MEMs sensor device to receive the process value therefrom (e.g., Fig. 4 #56: "ADC", Fig. 4 #60: "PROCESSOR"), **the processing circuit configured to convert the process value to an output digital signal** (e.g., pg. 4 lines 15-24, pg. 15 lines 21-30) **configured to be communicated to another element of the**

building automation system (e.g., pg. 6 lines 19-29: "The actuator commands may be received via...another sensor assembly");

a battery operably connected to provide power to at least the processing circuit (e.g., pg. 15 lines 14-21: "battery"); **and wherein the at least one MEMs sensor device and the processing circuit are integrated onto a first substrate** (e.g., pg. 15 line 31 – pg. 16 line 3: "The system preferably includes a single chip including both the sensor, required logic components or processing components, e.g., microprocessor, and a wireless transmission component, e.g., radio frequency generator, all included within a single chip. By integrating the sensing, processing (optional memory), and transmission functionalities, the device may be made compact and robust."); **and wherein the battery is ~~secured~~ <u>connected</u> to the first substrate** (e.g., pg. 15 lines 14-21: "battery", pg. 15 line 31 – pg. 16 line 3: "the device may be made compact").

22. The apparatus of claim 21 wherein the fist substrate is a semiconductor substrate (e.g., pg. 15 line 31 – pg. 16 line 3).

Graviton does not explicitly disclose that the battery is secured to the first substrate (claims 6 and 21), or that the battery is a lithium ion battery (claims 8, 23) coupled to a power management circuit (claims 9, 24), and disposed between a first and second substrate (claims 10, 25).

However, Yamazaki et al. discloses a layered substrate with a lithium ion battery (e.g., Fig. 1 #16, 18, 20) secured and disposed between a first and second substrate (e.g., [0060], Fig. 1 #12, 14, 24, 26, 28), and coupled to a power management circuit (e.g., [0034]: "charging circuit").

Graviton and Yamazaki et al. are analogous art since both pertain to substrates on which electronic parts are mounted, specifically to substrates used for compact electronic devices (e.g., [0002] of Yamazaki et al.).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Graviton with Yamazaki et al. since Yamazaki et al. teaches that sheet batteries can be used to reduce the size

and thickness of a compact electronic device (e.g., [0007]), and since power for parts on the substrates can be directly supplied from the battery of the layered substrate (e.g., [0009]), and since wiring can be simplified with sheet batteries (e.g., [0009]), and since a power management circuit means that sheet batteries can be reused (e.g., [0034]), and since disposing a sheet battery between a noise source substrate and a substrate from which one desires to prevent the effects of noise enables little noise effects to be provided without using an electromagnetic shielding plate (e.g., [0060]).

Claims 6, 8, 9, and 21-24 are additionally rejected under 35 U.S.C. 103(a) as being unpatentable over Graviton as applied to claim 1 above, and further in view of Doherty et al.

Graviton discloses most all features of claims 6, 21, and 22, and noted above.

Graviton does not explicitly disclose that the battery is secured to the first substrate (claims 6 and 21), or that the battery is a lithium ion battery (claims 8, 23) coupled to a power management circuit (claims 9, 24).

Doherty et al. discloses "smart dust" wireless integrated network sensors comprising a battery secured to a first substrate (e.g., Fig. 1: "Thick-Film Battery", EN: *The battery is secured to the substrate via the power capacitor.*), wherein the battery is a lithium ion battery (e.g., pg. 122 col. 2: "lithium energy cell") coupled to a power management circuit (e.g., pg. 132 col. 1: "It is essential that nodes be powered down whenever possible to conserve energy...robust and efficient wake-up algorithms").

Graviton and Doherty et al. are analogous art since both pertain to wireless integrated network sensors used in a building automation environment.

It would have been obvious to one having ordinary skill in the art the time the invention was made to modify Graviton with Doherty et al. in order to make the device of Graviton as compact as possible by vertically securing the integrated circuit substrate to the battery, as taught by Doherty et al.

Rejections based on Doherty et al.

Claims 1, 2, 5-9, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doherty et al. in view of UC Berkeley (or Jacobsen).

Regarding claims 1, 2, 5-9, and 11, Doherty et al. discloses:

1. **An apparatus** (e.g., Fig. 1: "node") **for use in a building automation system, the building automation system including one or more devices that are operable to generate control outputs based on set point information and process value information from one or more sensors, the building automation system further including one or more actuators operable to perform an operation responsive to at least some of the control outputs** (EN: *Statements of intended use in the preamble or statements that don't limit the structure of the claimed "apparatus" are not given patentable weight. The "building automation system including one or more devices" is external to the claimed "apparatus" and does not limit the claimed "apparatus".*), **the apparatus comprising:**

at least one microlectromechanical (MEMs) sensor device operable to generate a process value (e.g., pg. 121 col. 2: "MEMS-based (Micro-ElectroMechanical System) sensors");

a processing circuit configured to convert the process value to an output digital signal (e.g., Fig. 1: "analog-to-digital converter") **and to cause the output digital signal to be communicated to another element of the building automation system** (e.g., Section 6.1: "The role of the sensor network in this context is to measure the conditions for each worker and to communicate this information to a centralized computer for actuation of heating units, humidifiers, fans, and lights to best accommodate the current denizens of the workspace"); **and**

wherein the at least one MEMs sensor device and the processing circuit are integrated onto a first substrate (e.g., pg. 121 col. 2: "The MEMS-based (Micro-ElectroMechanical System) sensors and integrated circuitry for

processing and RF communication can all be mass produced on the same silicon substrate.");

wherein ~~the processing circuit~~ a centralized controller is further configured to generate a first control output (e.g., Section 6.1: "a centralized computer for actuation of heating units, humidifiers, fans, and lights to best accommodate the current denizens of the workspace") **based on at least one set point** (e.g., Section 6.1: "individual preferences for temperature, humidity, and light level") **and the process value obtained from the at least one MEMs sensor device** (e.g., Section 6.1: "The role of the sensor network in this context is to measure the conditions for each worker and to communicate this information to a centralized computer"), **and wherein the output digital signal is representative of the first control output** (EN: *Rejected under 112 2nd paragraph above.*).

2. The apparatus of claim 1 wherein the processing circuit includes a microelectronics A/D converter, the microelectronics A/D converter operable to receive the process value from the at least one MEMs sensor device and generate a digital sensor signal therefrom (e.g., Fig. 1: "analog-to-digital converter").

5. The apparatus of claim 1 wherein the at least one MEMs sensor device includes a plurality of MEMs sensor devices (e.g., Fig. 1: "sensor").

6. The apparatus of claim 1 further comprising a battery secured to the first substrate (e.g., Fig. 1: "Thick-Film Battery", EN: *The battery is secured to the substrate via the power capacitor.*).

7. The apparatus of claim 1 wherein the first substrate is a semiconductor substrate (e.g., pg. 121 col. 2: "silicon substrate").

8. The apparatus of claim 6 wherein the battery further comprises a lithium ion battery layer (e.g., pg. 122 col. 2: "lithium energy cell").

9. The apparatus of claim 8 further comprising a power management circuit operably coupled to the lithium ion battery layer (e.g., pg. 132 col. 1:

"It is essential that nodes be powered down whenever possible to conserve energy...robust and efficient wake-up algorithms").

11. The apparatus of claim 1 further comprising an RF communication circuit operably coupled to the processing circuit (e.g., Section 5.1: "RF Communication"), **the RF communication circuit operably connected to provide the output digital signal go the other element of the building automation system** (e.g., Section 6.1: "The role of the sensor network in this context is to measure the conditions for each worker and to communicate this information to a centralized computer for actuation of heating units, humidifiers, fans, and lights to best accommodate the current denizens of the workspace").

Regarding claim 1, as noted above, Doherty et al. does not specifically disclose that it is the "smart dust" node processing circuit that generates the first control output based on the at least one set point and the process value obtained from the at least one MEMs sensor device.

Rather, Doherty et al. discloses that a centralized computer performs this function (Section 6.1). Although Doherty et al. teaches that the brunt of the network's work should be done locally to minimize the communication costs of sending unnecessary information, Doherty et al. also acknowledges that memory and hardware limitations may impose constraints on the types of computation that are possible on individual sensor nodes (pg. 132), which is apparently why Doherty et al. chooses to generate the actuator control outputs (based on at the least one set point and the sensor process value) at the centralized computer instead of at the smart dust mote itself.

UC Berkeley discloses a smart building using "smart dust" motes that keep a "constant vigil on light and temperature conditions" (pg. 2). UC Berkeley also teaches the desire to evolve passive sensors into more active sensors, and discloses that these active smart dust motes could then intelligently cut power automatically to certain devices during times of peak power demand (pg. 2). Thus, UC Berkeley discloses smart dust motes that can generate and output

actuator control signals at the mote itself, instead of at a centralized computer as disclosed by Doherty et al.

Doherty et al. and UC Berkeley are analogous art since both pertain to "smart dust" employed in a smart building automation system.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus processing circuit of Doherty et al. to enable it to generate the first control output based on the at least one set point and the sensor process value (instead of or in addition to having the first control output being generated at the centralized controller) since UC Berkeley teaches that "everything should have its own built-in intelligence" (page 2), and since Doherty et al. teaches that, "Whenever possible, the brunt of the network's work should be done locally to minimize the communication costs of sending unnecessary information" (pg. 132). Thus, such a modification would allow the centralized controller of Doherty et al. to be bypassed altogether, and would minimize costs.

Jacobsen discloses smart sensors for distributed control networks in building control and monitoring systems. These smart sensor nodes contain local intelligence that not only allows the sensing node to receive and send data digitally, but also to receive and send *commands*. These commands can include commands to drive and actuator in a building control and monitoring environment (pg. 285 col. 1).

Doherty et al. and Jacobsen are analogous are since both pertain to network sensors employed in a building control and monitoring system.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus processing circuit of Doherty et al. to enable it to generate the first control output based on the at least one set point and the sensor process value (instead of or in addition to having the first control output being generated at the centralized controller) since Doherty et al. teaches that, "Whenever possible, the brunt of the network's work

should be done locally to minimize the communication costs of sending unnecessary information" (pg. 132). Thus, such a modification would allow the centralized controller of Doherty et al. to be bypassed altogether, and would minimize costs.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Doherty et al. in view of UC Berkeley (or Jacobsen) as applied to claim 8 above, and further in view of Yamazaki et al. US 2001/0033963.

Doherty et al. as modified by UC Berkeley (or Jacobsen) does not appear to disclose that the "smart dust" mote comprises a second substrate, wherein the lithium ion battery layer is disposed between the first substrate and the second substrate.

However, Yamazaki et al. discloses a layered substrate with a lithium ion battery (e.g., Fig. 1 #16, 18, 20) secured and disposed between a first and second substrate (e.g., [0060], Fig. 1 #12, 14, 24, 26, 28), and coupled to a power management circuit (e.g., [0034]: "charging circuit").

Doherty et al. as modified by UC Berkeley (or Jacobsen), and Yamazaki et al., are analogous art since both pertain to substrates on which electronic parts are mounted, specifically to substrates used for compact electronic devices (e.g., [0002] of Yamazaki et al.).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Doherty et al. as modified by UC Berkeley (or Jacobsen) with Yamazaki et al. since Yamazaki et al. teaches that sheet batteries can be used to reduce the size and thickness of a compact electronic device (e.g., [0007]), and since power for parts on the substrates can be directly supplied from the battery of the layered substrate (e.g., [0009]), and since wiring can be simplified with sheet batteries (e.g., [0009]), and since a power management circuit means that sheet batteries can be reused (e.g., [0034]), and since disposing a sheet battery between a noise source substrate and a substrate from which one desires to prevent the effects of noise enables

little noise effects to be provided without using an electromagnetic shielding plate (e.g., [0060]).

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Doherty et al. as modified by UC Berkeley (or Jacobsen) as applied to claim 1 above, and further in view of Hill et al.

Doherty et al. as modified by UC Berkeley (or Jacobsen) does not appear to explicitly disclose an EEPROM operably coupled to the processing circuit.

Doherty et al. as modified by UC Berkeley (or Jacobsen) discloses that the processor design can follow the Harvard architecture and utilize two separate memories – one for the program and one for data (pg. 125 col. 1 of Doherty et al.). It is well known that in Harvard architectures, instructions are generally stored in a non-volatile read-only memory (such as EEPROM) while data memory generally requires random-access memory.

For example, Hill et al. discloses a system Harvard architecture (e.g., Section 3.1: "8-bit Harvard architecture") for wireless integrated network sensors (smart dust motes) comprising a programmable non-volatile memory operably coupled to the processing circuit, wherein the programmable non-volatile memory comprises an EEPROM (Section 3: "It consists of a microcontroller with internal flash program memory, data SRAM, and data EEPROM").

Doherty et al. as modified by UC Berkeley (or Jacobsen), and Hill et al., are analogous art since both pertain to smart dust motes, and are authored by some overlapping author(s).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Doherty et al. as modified by UC Berkeley (or Jacobsen) with Hill et al. since Hill et al. teaches that an EEPROM would allow the sensor of Doherty et al. as modified by UC Berkeley (or Jacobsen) to be reprogrammed by transferring data from the network into the EEPROM (Section 3.1).

Claims 21-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Doherty et al.

Doherty et al. teaches:

21. An apparatus (e.g., Fig. 1: "node") **for use in a building automation system, the building automation system including one or more devices that are operable to generate a control output based on set point information and process value information from one or more sensors** (EN: *Statements of intended use in the preamble or statements that don't limit the structure of the claimed "apparatus" are not given patentable weight. The "building automation system including one or more devices" is external to the claimed "apparatus" and does not limit the claimed "apparatus".*)**, the apparatus comprising:**

at least one microelectromechanical (MEMs) sensor device operable to generate a process value (e.g., pg. 121 col. 2: "MEMS-based (Micro-ElectroMechanical System) sensors")**;**

a processing circuit operably connected to the at least one MEMs sensor device to receive the process value therefrom, the processing circuit configured to convert the process value to an output digital signal (e.g., Fig. 1: "analog-to-digital converter") **configured to be communicated to another element of the building automation system** (e.g., Fig. 1: "communications devices", Section 6.1: "The role of the sensor network in this context is to measure the conditions for each worker and to communicate this information to a centralized computer for actuation of heating units, humidifiers, fans, and lights to best accommodate the current denizens of the workspace", EN: *Intended use of the claimed "output digital signal", not positively recited.*)**;**

a battery operably connected to provide power to at least the processing circuit (e.g., Fig. 1: "Thick-Film Battery")**; and**

wherein the at least one MEMs sensor device and the processing circuit are integrated onto a first substrate (e.g., pg. 121 col. 2: "The MEMS-based (Micro-ElectroMechanical System) sensors and integrated circuitry for

processing and RF communication can all be mass produced on the same silicon substrate."), **and wherein the battery is secured to the first substrate** (e.g., Fig. 1: "Thick-Film Battery", EN: *The battery is secured to the substrate via the power capacitor.*).

22. The apparatus of claim 21 wherein the fist substrate is a semiconductor substrate (e.g., pg. 121 col. 2: "silicon substrate").

23. The apparatus of claim 22 wherein the battery further comprises a lithium ion battery (e.g., pg. 122 col. 2: "lithium energy cell").

24. The apparatus of claim 23 further comprising a power management circuit operably coupled to the lithium ion battery layer (e.g., pg. 132 col. 1: "It is essential that nodes be powered down whenever possible to conserve energy...robust and efficient wake-up algorithms").

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Doherty et al. as applied to claim 23 above, and further in view of Yamazaki et al. US 2001/0033963.

Doherty et al. does not appear to disclose that the smart dust mote comprises a second substrate, wherein the lithium ion battery layer is disposed between the first substrate and the second substrate.

However, Yamazaki et al. discloses a layered substrate with a lithium ion battery (e.g., Fig. 1 #16, 18, 20) secured and disposed between a first and second substrate (e.g., [0060], Fig. 1 #12, 14, 24, 26, 28), and coupled to a power management circuit (e.g., [0034]: "charging circuit").

Doherty et al. and Yamazaki et al. are analogous art since both pertain to substrates on which electronic parts are mounted, specifically to substrates used for compact electronic devices (e.g., [0002] of Yamazaki et al.).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Doherty et al. with Yamazaki et al. since Yamazaki et al. teaches that sheet batteries can be used to reduce the size and thickness of a compact electronic device (e.g., [0007]), and since power

for parts on the substrates can be directly supplied from the battery of the layered substrate (e.g., [0009]), and since wiring can be simplified with sheet batteries (e.g., [0009]), and since a power management circuit means that sheet batteries can be reused (e.g., [0034]), and since disposing a sheet battery between a noise source substrate and a substrate from which one desires to prevent the effects of noise enables little noise effects to be provided without using an electromagnetic shielding plate (e.g., [0060]).

Claims 26-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doherty et al. in view of Hill et al.

Regarding claims 26 and 28-32, Doherty et al. discloses:

26. An apparatus (e.g., Fig. 1: "node") **for use in a building automation system, the building automation system including one or more devices that are operable to generate a control output based on set point information and process value information from one or more sensors** (EN: *Statements of intended use in the preamble or statements that don't limit the structure of the claimed "apparatus" are not given patentable weight. The "building automation system including one or more devices" is external to the claimed "apparatus" and is not given patentable weight.*)**, the apparatus comprising:**

at least one microelectromechanical (MEMs) sensor device operable to generate a process value (e.g., pg. 121 col. 2: "MEMS-based (Micro-ElectroMechanical System) sensors")**;**

a processing circuit operably connected to the at least one MEMS sensor device to receive the process value therefrom, the processing circuit configured to convert the process value to an output digital signal (e.g., Fig. 1: "analog-to-digital converter") **configured to be communicated to another element of the building automation system** (e.g., Fig. 1: "communications devices", EN: *Intended use of the claimed "output digital signal".*)**;**

a programmable ~~non-volatile~~ memory (e.g., pg. 125 col. 1: "A low-power processor design would follow the Harvard architecture and utilize two separate memories – one for the program and one for the data."), **operably coupled to the processing circuit and supported by the first substrate** (e.g., pg. 121 col. 2: "The MEMS-based (Micro-ElectroMechanical System) sensors and integrated circuitry for processing and RF communication can all be mass produced on the same silicon substrate."); **and**

wherein the at least one MEMS sensor device and the processing circuit are integrated onto a first substrate (e.g., pg. 121 col. 2: "The MEMS-based (Micro-ElectroMechanical System) sensors and integrated circuitry for processing and RF communication can all be mass produced on the same silicon substrate.").

28. The apparatus of claim 26, wherein the programmable non-volatile memory is further operable to store configuration information relating to the apparatus (EN: *Apparatus claims must be structurally distinguishable from the prior art. This is an intended use/functional limitation of the "memory". The prior art "memory" of Doherty et al. is capable of storing many types of information, including configuration information.*).

29. The apparatus of claim 28, wherein the configuration information includes identification information for the apparatus (EN: *Apparatus claims must be structurally distinguishable from the prior art. This is an intended use/functional limitation of the "memory". The prior art "memory" of Doherty et al. is capable of storing many types of information, including identification information.*).

30. The apparatus of claim 29, wherein the configuration information includes a network address corresponding to the apparatus (EN: *Apparatus claims must be structurally distinguishable from the prior art. This is an intended use/functional limitation of the "memory". The prior art "memory" of Doherty et al. is capable of storing many types of information, including network address information.*).

31. The apparatus of claim 28, wherein the configuration information includes function enabling information, the function identifying information identifying as enabled less than all of the possible sensing functions available to be enabled on the sensor (EN: *Apparatus claims must be structurally distinguishable from the prior art. This is an intended use/functional limitation of the claimed "memory". The prior art "memory" of Doherty et al. is capable of storing many types of information, including configuration information.*).

32. The apparatus of claim 28, wherein the configuration information includes system RF communication parameters (EN: *Apparatus claims must be structurally distinguishable from the prior art. This is an intended use/functional limitation of the "memory". The prior art "memory" of Doherty is capable of storing many types of information, including RF communication parameters.*).

Regarding claims 26, 27, and 33-36, Doherty et al. does not appear to explicitly disclose that the memory is a programmable non-volatile memory (claim 26), such as an EEPROM (claims 27 and 33-36).

Doherty et al. discloses that the processor design can follow the Harvard architecture and utilize two separate memories – one for the program and one for data (pg. 125 col. 1). It is well known that in Harvard architectures, instructions are generally stored in a non-volatile read-only memory while data memory generally requires random-access memory.

For example, Hill et al. discloses a system Harvard architecture (e.g., Section 3.1: "8-bit Harvard architecture") for wireless integrated network sensors (smart dust motes) comprising a programmable non-volatile memory operably coupled to the processing circuit, wherein the programmable non-volatile memory comprises an EEPROM (Section 3: "It consists of a microcontroller with internal flash program memory, data SRAM, and data EEPROM").

Doherty et al. and Hill et al. are analogous art since both pertain to smart dust motes, and are authored by some overlapping author(s).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Doherty et al. with Hill et al. since Hill et al. teaches that an EEPROM would allow the sensor of Doherty et al. to be reprogrammed by transferring data from the network into the EEPROM (Section 3.1).

Rejections based on Asada et al.

Claims 1, 2, 5, 7, and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Asada et al.

Asada et al. discloses:

1. **An apparatus** (e.g., Fig. 1: "wireless integrated network sensor") **for use in a building automation system, the building automation system including one or more devices that are operable to generate control outputs based on set point information and process value information from one or more sensors, the building automation system further including one or more actuators operable to perform an operation responsive to at least some of the control outputs** (EN: *Statements of intended use in the preamble or statements that don't limit the structure of the claimed "apparatus" are not given patentable weight. The "building automation system including one or more devices" is external to the claimed "apparatus".*), **the apparatus comprising:**

at least one microlectromechanical (MEMs) sensor device operable to generate a process value (e.g., Fig. 1, Fig. 7: "sensor", Section 4: "MEMS")**;**

a processing circuit configured to convert the process value to an output digital signal (e.g., Fig. 1, Fig. 7: "ADC") **and to cause the output digital signal to be communicated to another element of the building automation system** (e.g., Fig. 1, Fig. 7: "control", "network interface", Section 3: "Protocols for node operation then determine whether a remote user or neighboring WINS node should be alerted. The WINS node then supplies an attribute of the identified event, for example, the address of the event in an event look-up table stored in all network nodes.")**; and**

wherein the at least one MEMs sensor device and the processing circuit are integrated onto a first substrate (e.g., Section 4: "This sensor-substrate 'sensorstrate' is then a platform for support of interface, signal processing, and communication circuits")**;**

wherein the processing circuit is further configured to generate a first control output (e.g., Fig. 1, Fig. 7: "control", Section 3: "In the event that an

event is detected, the spectrum analyzer output may trigger the microcontroller (the microcontroller may be a simple finite state machine). The microcontroller may then issue commands.") **based on at least one set point and the process value obtained from the at least one MEMs sensor device** (e.g., Section 6: "Finally, PSD values are compared with background reference values (that may be either downloaded or learned). In the event that the measured PSD spectrum values exceed that of the background reference values, the operation of a microcontroller is triggered.", EN: *The background reference values correspond to the claimed "set point". The "measured PSD spectrum values" correspond to the claimed "process value". The "issued commands" correspond to the claimed "control output".*), **and wherein the output digital signal is representative of the first control output** (EN: *Rejected under 112 2nd paragraph above. For the purposes of claim interpretation, the "output digital signal" and the "first control output" are considered to be separate and distinct signals, the "output digital signal" being required to be communicated to another element of the building automation system, and the "first control output" not being required to be communicated to another element of the building automation system.*).

2. The apparatus of claim 1 wherein the processing circuit includes a microelectronics A/D converter, the microelectronics A/D converter operable to receive the process value from the at least one MEMs sensor device and generate a digital sensor signal therefrom (e.g., Fig. 1: "ADC").

5. The apparatus of claim 1 wherein the at least one MEMs sensor device includes a plurality of MEMs sensor devices (e.g., Fig. 3).

7. The apparatus of claim 1 wherein the first substrate is a semiconductor substrate (e.g., Section 4: "ceramic substrate").

11. The apparatus of claim 1 further comprising an RF communication circuit operably coupled to the processing circuit (e.g., Fig. 1: "wireless network interface"), **the RF communication circuit operably connected to provide the output digital signal go the other element of the building automation system.**

Claims 6, 8, 9, and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Asada et al. as applied to claim 1 above, and further in view of Doherty et al.

Asada discloses:

6. The apparatus of claim 1 further comprising a battery ~~secured~~ <u>connected</u> to the first substrate (e.g., Section 3: "sensor nodes powered by compact battery cells").

8. The apparatus of claim 6 wherein the battery further comprises a lithium ion battery layer (e.g., Section 3: "Li coin cells").

9. The apparatus of claim 8 further comprising a power management circuit operably coupled to the lithium battery layer (e.g., Section 2: "low power sensor interface and signal processing architecture and circuits enable continuous low power monitoring").

21. An apparatus (e.g., Fig. 1: "wireless integrated network sensor") **for use in a building automation system, the building automation system including one or more devices that are operable to generate a control output based on set point information and process value information from one or more sensors** (EN: *Statements of intended use in the preamble or statements that don't limit the structure of the claimed "apparatus" are not given patentable weight. The "building automation system including one or more devices" is external to the claimed "apparatus".*), **the apparatus comprising:**

at least one microelectromechanical (MEMs) sensor device operable to generate a process value (e.g., Fig. 1, Fig. 7: "sensor", Section 4: "MEMS");

a processing circuit operably connected to the at least one MEMs sensor device to receive the process value therefrom, the processing circuit configured to convert the process value to an output digital signal (e.g., Fig. 1, Fig. 7: "ADC") **configured to be communicated to another element of the building automation system** (e.g., Fig. 1, Fig. 7: "control", "network interface", Section 3: "Protocols for node operation then determine whether a remote user or neighboring WINS node should be alerted. The WINS

node then supplies an attribute of the identified event, for example, the address of the event in an event look-up table stored in all network nodes.", EN: *Intended use of the claimed "output digital signal".*);

a battery operably connected to provide power to at least the processing circuit (e.g., Section 3: "sensor nodes powered by compact battery cells")**; and**

wherein the at least one MEMs sensor device and the processing circuit are integrated onto a first substrate (e.g., Section 4: "This sensor-substrate "sensorstrate" is then a platform for support of interface, signal processing, and communication circuits")**, and wherein the battery is ~~secured~~ <u>connected</u> to the first substrate** (e.g., Section 3: "sensor nodes powered by compact battery cells")**.**

22. The apparatus of claim 21 wherein the fist substrate is a semiconductor substrate (e.g., Section 4: "ceramic substrate")**.**

23. The apparatus of claim 22 wherein the battery further comprises a lithium ion battery (e.g., Section 3: "Li coin cells")**.**

24. The apparatus of claim 23 further comprising a power management circuit operably coupled to the lithium ion battery layer (e.g., Section 2: "low power sensor interface and signal processing architecture and circuits enable continuous low power monitoring")**.**

As noted above, Asada et al. does not appear to explicitly disclose that the battery is "secured" to the first substrate (claims 6 and 21).

Doherty et al. discloses a wireless integrated network sensor (i.e., "smart dust") comprising an integrated circuit secured to a battery via a power capacitor (e.g., Fig. 1).

Asada et al. and Doherty et al. are analogous art since they both pertain to wireless integrated network sensors.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Asada et al. with Doherty et al., i.e., vertically "secure" the battery of Asada et al. to the substrate as taught by

Doherty et al. (e.g., Fig. 1) in order to make the device of Asada et al. as small and compact as possible, i.e., a "cubic millimeter scale node", as taught by Doherty et al. (e.g., abstract).

Claims 6, 8-10, and 21-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Asada et al. as applied to claim 1 above, and further in view of Yamazaki et al. US 2001/0033963.

As noted above, Asada et al. does not appear to explicitly disclose that the battery is "secured" to the first substrate (claims 6 and 21). And Asada et al. does not appear to disclose that the smart dust mote comprises a second substrate, wherein the lithium ion battery layer is disposed between the first substrate and the second substrate (claims 10 and 25).

However, Yamazaki et al. discloses a layered substrate with a lithium ion battery (e.g., Fig. 1 #16, 18, 20) secured and disposed between a first and second substrate (e.g., [0060], Fig. 1 #12, 14, 24, 26, 28), and coupled to a power management circuit (e.g., [0034]: "charging circuit").

Asada et al. and Yamazaki et al. are analogous art since both pertain to substrates on which electronic parts are mounted, specifically to substrates used for compact electronic devices (e.g., [0002] of Yamazaki et al.).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Asada et al. with Yamazaki et al. since Yamazaki et al. teaches that sheet batteries can be used to reduce the size and thickness of a compact electronic device (e.g., [0007]), and since power for parts on the substrates can be directly supplied from the battery of the layered substrate (e.g., [0009]), and since wiring can be simplified with sheet batteries (e.g., [0009]), and since a power management circuit means that sheet batteries can be reused (e.g., [0034]), and since disposing a sheet battery between a noise source substrate and a substrate from which one desires to prevent the effects of noise enables little noise effects to be provided without using an electromagnetic shielding plate (e.g., [0060]).

Claims 12 and 26-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Asada et al. as applied to claim 1 above, and further in view of Hill et al.

Asada et al. discloses most all features of these claims as detailed above, including a memory operably coupled to the processing circuit.

Asada et al. does not specifically disclose that the memory is a programmable non-volatile memory (claim 26), wherein the programmable non-volatile memory comprises an EEPROM (claims 12 and 27).

Hill et al. discloses a system Harvard architecture (e.g., Section 3.1: "8-bit Harvard architecture") for wireless integrated network sensors comprising a programmable non-volatile memory operably coupled to the processing circuit, wherein the programmable non-volatile memory comprises an EEPROM (Section 3: "It consists of a microcontroller with internal flash program memory, data SRAM, and data EEPROM").

Asada et al. and Hill et al., are analogous art since both pertain to wireless integrated network sensors.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Asada et al. with Hill et al. since Hill et al. teaches that an EEPROM would allow the sensor of Asada et al. to be reprogrammed by transferring data from the network into the EEPROM (Section 3.1).

Response to Arguments

Applicant's arguments, see pages 19-20, filed 12/11/2006, with respect to the drawing, specification, and claim objections have been fully considered and are persuasive. The drawing, specification, and claim objections have been withdrawn in light of the amendments filed 12/11/2006.

Applicant's arguments, see pages 20-22, filed 12/11/2006, with respect to the rejection of claim 1 under 35 U.S.C. 102(b) as being anticipated by Asada et al. have been fully considered and are persuasive to the extent that the claimed processing circuit has a structural configuration of needing to be configured to, via software and/or hardware, carry out the claimed limitation of generating a first control output based on at least one set point and the process value. However, it is nevertheless deemed that Asada et al. does teach a processing circuit configured to "generate a first control output based on at least one set point and the process value" since Asada et al. at least teaches that operation of the microcontroller is triggered (claimed "control output") when the measured PSD spectrum values (based on claimed "process value") exceed that of the background reference values (claimed "set point").

Applicant's arguments, see pages 23-24, filed 12/11/2006, with respect to the rejection of claim 21 under 35 U.S.C. 102(b) as being anticipated by Asada et al. have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Asada et al. in view of Doherty et al.

Applicant's arguments, see pages 24-26, filed 12/11/2006, with respect to the rejection of claim 1 under 35 U.S.C. 102(b) as being anticipated by Graviton have been fully considered but they are not persuasive.

Examiner does not refute that Graviton teaches control outputs generated by a separate node 70 (page 16 line 30 – page 17 line 9). But this does not

mean that Graviton cannot also teach control outputs generated by the sensor assembly 50 processor 60 (see Fig. 4).

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "the control value is provided as an output digital signal to another building automation system device") are not recited in the rejected claim(s). Applicant only recites that the "output digital signal" is provided to another building automation system device. Applicant does not explicitly recite that the "first control output" is provided to another building automation system device. As noted above in the rejection under 35 U.S.C. 112 2nd, it is ambiguous to recite that the "output digital signal is representative of the first control output", since these are clearly two different and distinct signals. One is a digital sensor reading, another is a control output based on the sensor reading and a setpoint. They cannot be the same thing. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

However, assuming that the claims are amended to recite that the first control output is provided as an output digital signal to another element of the building automation system, Graviton teaches the feature nonetheless.

On page 26 of the arguments, Applicant argues that Graviton identifies a completely self-contained sensor/actuator device, and thus there would be no reason for the processor 60 of Graviton to communicate the control signal to another element of the building automation system. However, this is clearly not the case since Graviton identifies a "processor 60" effectuating the control. And, as depicted in Fig. 4 of Graviton, the "sensor assembly 50" including "processor 60" clearly has no actuator associated with it. Rather, the "actuator 90" is associated with the "actuator assembly", which is clearly separate and remote from the "sensor assembly 50". Thus, there would be reason and a necessity for the processor 60 of Graviton to communicate the control signal to another element of the building automation system.

Applicant's arguments, see pages 27-29, filed 12/11/2006, with respect to the rejection(s) of claim(s) 21 under 35 U.S.C. 102(b) as being anticipated by Graviton have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Graviton in view of Yamazaki, and Graviton in view of Doherty et al.

Applicant's arguments, see page 30, filed 12/11/2006, with respect to the rejection of claim(s) 26 under 35 U.S.C. 102(b) as being anticipated by Graviton have been fully considered but they are not persuasive. See rejection of claim 26 above.

Applicant's arguments, see page 31, filed 12/11/2006, with respect to the rejection of claim(s) 8-10 and 23-25 under 35 U.S.C. 103(a) as being unpatentable over Graviton in view of Yamazaki et al. have been fully considered but are not persuasive in view of Fig. 1 of Yamazaki et al. and in view of Applicant's own arguments on page 28 of the Arguments filed 12/11/2006. Applicant states, "While claim 21 does not require that the battery be *directly* secured to the substrate, there must be at least some mounting or supporting relationship between the battery and the substrate". There is clearly a mounting or supporting relationship between the batteries 16, 18, 20 and the integrated circuit substrates 24, 26, and 28 of Yamazaki et al. in Fig. 1.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan A. Jarrett whose telephone number is (571) 272-3742. The examiner can normally be reached on 10:00-6:30 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Picard can be reached on (571) 272-3749. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Examiner
Art Unit 2125

03/01/2007